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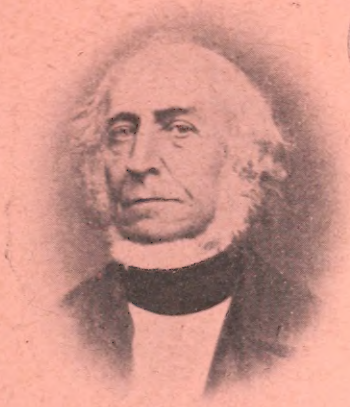

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ASPIDIOTUS TSUGAE—MARLATT.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXII. NOVEMBER, 1911. No. 8.

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A Newly-Imported Scale-Pest on Japanese Hemlock (Rhynch.).

By C. L. MARLATT, Bureau of Entomology, U. S. Dept. of Agriculture, Washington, D. C.

(Plate XIII.)

Aspidiotus (Diaspidiotus) tsugae n. sp.

Scale of female.—Diameter, 1 1-3 mm.; circular, strongly convex, dark brown, rather pointed or nippled at center; central area usually covered by secretion, when rubbed a light resinous yellow.

Scale of male.—The normal oval shape, much smaller than female, secretion covering center or nipple, somewhat ashen, forming a light central spot.

Adult female.—Oval; .85 mm. long, .68 mm. broad, in general hyaline as mounted in balsam; *anal plate* broad, rounded, .34 mm. broad at extreme base, and .18 mm. long, nearly hyaline except the paraphyses; two pairs of short and rounded lobes, latter condition probably due to wear (newly molted adult individuals will probably exhibit the usual lateral shoulders); beyond the second lateral incision a prominent serrated projection having three or more distinct minute teeth; edge of pygidium beyond this projection unbroken; incisions median and lateral scarcely below the general level of the edge of the pygidium; paraphyses very prominent and robust, pear-shaped, two prominent ones at the base of each lobe, most of them fully lobe length, and another below the second lateral incision; also a few smaller para-

physes in the lobular area; plates broad, branched at tip, equaling the lobes in length, two median, two in first lateral incision and three in second lateral incision; spines short, inconspicuous; anal opening large, oval, in longest diameter more than twice lobe length, less than twice its own length from apex; paragenitals, counting from the anterior group, 2-4, 5-7, 4-5, not massed, no parastigmal pores; dorsal pores large, narrow, those easily seen are row of three extending from second lateral incision, somewhat double row or group of from five to seven at about the middle point of the side of the pygidium, and a group of seven or eight at the basal or anterior lateral angle of the pygidium; the actual number of pores is greater, as shown by the presence of the internal secretory organs, namely, median one, first incision 3, second incision 5, the laterals 6-8 and anterior angle 8; basal thickenings not prominent, obscure; ventral thickenings normal and not much developed.

Type.—Bureau of Entomology, No. 14,185. On Japanese hemlock (*Tsuga* sp.), received from Dr. J. B. Smith, March 11, 1910, who collected it in the course of his quarantine work from stock imported from Japan.

From the specimens submitted, the plant is apparently heavily infested, chiefly on the underside of the leaflets. The condition indicates a scale pest capable of doing much damage.

This scale insect is a good example of the difficulties met with in attempting to subdivide the old and unwieldy genus *Aspidiotus* into subgenera. The character of the lobes, the prominent serrated, or toothed, projection laterad of the lobes, and large anal opening remind one very much of the species of *Aspidiotus* (s. str.) which infest pines. It comes, in fact, very close to the Chinese species described by the writer as *Aspidiotus meyeri*. The strong development, however, of the paraphyses is a feature found in none of the pine species referred to, and allies it with the genus (or subgenus) *Diaspidiotus*. The paraphyses seems to be a fairly definite and prominent character in *Diaspidiotus* and most of the genera or subgenera erected from the old genus *Aspidiotus*. In the case of *Aspidiotus* (s. str.), the paraphyses are reduced to mere points, or are practically wanting, but all gradations between this condition and well developed paraphyses are found, indicating plainly the entire artificiality of classification based on this character. In

this instance we have a species which is evidently closely related to other pine species, perhaps even being a mere variety, but on this character would fall in a different subgenus. The absence of plates laterad of the serrated lobe may be due simply to age and wear, as is undoubtedly also the short and rounded condition of the two median pairs of lobes. The differences, however, in the plates, lobes, lateral serrated projection, and especially in the paraphyses, warrant, in connection with the difference in habitat, assigning a new name to this form.

Orthoptera of North Carolina.

By F. SHERMAN, JR., and C. S. BRIMLEY, Raleigh, N. C.

The following list includes some records of Orthoptera, known by the authors to occur in North Carolina. When sufficient data are available to ascertain distribution this is indicated by such terms as "whole state," "mountains," "eastern section," etc. Where we have only a few scattered records, the localities are specified. We have not included dates of capture, but can supply them to interested persons on request.

In addition to the authors, persons who have made material contributions to our knowledge of the Orthoptera of the state are: Professor A. P. Morse, Wellesley College, Mass.; Mr. G. M. Bentley, Knoxville, Tenn., and Mr. R. S. Woglum, of the U. S. Bureau of Entomology,—the last two having both been engaged in entomological work in this state in former years; and Messrs. Rehn and Hebard, of Philadelphia.*

We have arranged the *families* in the usual recognized sequence, the *genera* alphabetically in each family, and the *species* alphabetically in each genus.

The paper is compiled from the card catalogue of the Division of Entomology, N. C. State Department of Agriculture, at Raleigh.

* At the time this article was written, the authors had not seen Messrs. Rehn and Hebard's very valuable article on the Orthoptera of North Carolina, entitled "Preliminary Studies of North Carolina Orthoptera" (Proc. Acad. Nat. Sci. Phil. Nov. 1910), and hence have omitted a number of species included by these gentlemen.

FAMILY FORFICULIDAE.

Anisolabis azteca Dohrn; whole State.
Labia burgessi Scudder; Raleigh, Boardman.
Labia minor Linn; Raleigh, Newton.
Labidura riparia Pallas; Raleigh.
Spongophora brunneipennis Serv.; Raleigh, Cape Hatteras.

FAMILY BLATTIDAE.

Blatta orientalis Linn; Raleigh, LaGrange.
Blattella germanica Linn; Raleigh.
Ceratinoptera lutea S. & Z.; Raleigh Havelock.
Cryptocercus punctulatus Scudder; Mountain region.
Ischnoptera bolliana S. & Z.; Raleigh.
Ischnoptera couloniana Sauss.; Raleigh, Southern Pines.
Ischnoptera deropeltiformis Brun.; Raleigh, Blantyre.
Ischnoptera divisa S. & Z.; Eastern section.
Ischnoptera johnsoni Rehn; Raleigh, Andrews.
Ischnoptera uhleriana Sauss.; Whole State.
Periplaneta americana Linn; Raleigh, Washington.

FAMILY MANTIDAE.

Stagmomantis carolina Linn.; Raleigh, Greensboro, Southern Pines.

FAMILY PHASMIDAE.

Diapheromera femorata Say; Raleigh, Southern Pines.

FAMILY ACRIDIDAE.

Acrydium granulatum Kirby; Mountains.
Acrydium hancocki Morse; Mountains.
Acrydium obscurum Hanck; Whole State.
Acrydium ornatum Say; Salisbury to Mountains.
Amblytropidia occidentalis Sauss.; Eastern section.
Arnilia chlorizans Walker; Lake Ellis.
Arphia sulphurea Fabr.; Whole State.
Arphia xanthoptera Germ.; Whole State.
Clinocephalus elegans Morse; Beaufort.
Clinocephalus pulcher Rehn and Hebard; Southport.
Chloealtis conspersa Harris; Mountains.
Chorthippus curtipennis Harris; Mountains.
Chortophaga viridifasciata DeG.; Whole State.
Dictyophorus reticulatus Thunb.; Cabarrus County.
Dissosteira carolina L.; Whole State.
Dichromorpha viridis Scudd.; Central section.
Encoptolophus sordidus Burm.; Mountains.

Eritettix simplex Scudd.; Hendersonville, Raleigh, Southern Pines.
Hippiscus apiculatus Harris; Mountains.
Hippiscus phoenicopterus Germ.; Whole State.
Hippiscus rugosus Scudd.; Whole State.
Leptysma marginicollis Serv.; Eastern section.
Melanoplus amplectens Scudd.; Mountains.
Melanoplus arboreus Scudd.; Southern Pines.
Melanoplus atlanis Riley; Whole State.
Melanoplus deceptus Morse; Mountains.
Melanoplus decoratus Morse; Mountains.
Melanoplus divergens Morse; Mountains.
Melanoplus devius Morse; Mountains.
Melanoplus femoratus Burm.; Raleigh to Mountains.
Melanoplus femur-rubrum DeG.; Whole State.
Melanoplus impudicus Scudd.; Mountains.
Melanoplus keeleri Scudd.; Eastern section.
Melanoplus luridus Dodge; Mountains.
Melanoplus minor Scudd.; Eastern section.
Melanoplus punctulatus Uhler; Raleigh, Blantyre.
Melanoplus scudderi Uhler; Raleigh and westward.
Melanoplus similis Morse; Mountains.
Melanoplus strumosus Morse; Eastern section.
Melanoplus sylvestris Morse; Mountains.
Melanoplus tribulus Morse; Mountains.
Mermiria alacris Scudd.; Southern Pines.
Mermiria bivittata Serv.; Havelock.
Mermiria intertexta Scudd.; Smith's Island.
Neotettix bolivari Hanc.; Whole State.
Nomotettix compressus Morse; Whole State.
Nomotettix cristatus Scudd.; Whole State.
Orphulella pelidna Burm.; Whole State.
Orphulella speciosa Scudd.; Linville.
Paratettix cucullatus Burm.; Whole State.
Paratettix mexicanus Sauss.; North Carolina.
Paroxya floridana Thomas; Whole State.
Paroxya scudderi Blatchley; Southern Pines.
Podisma glacialis variegata Scudd.; Mountains.
Psinidia fenestralis Serv.; Whole State.
Schistocerca alutacea Harris; Eastern section.
Schistocerca americana Drury; Whole State.
Schistocerca damnifica Sauss.; Whole State.
Schistocerca rubiginosa Scudd.; Southport, Southern Pines and Graham County.

Scirtetica picta Scudd.; Eastern section.
Spharagemon collare wyomingianum H.; Eastern section.
Spharagemon bolli Scudd.; Mountains east to Raleigh.
Syrbula admirabilis Uhl.; Whole State.
Tettigidea armata Morse; Boardman.
Tettigidea lateralis Say.; Whole State.
Tettigidea prorsa Scudd.; N. C.
Trimerotropis citrina Scudd.; Whole State.
Trimerotropis maritima Harris; Coast.
Trimerotropis citrina × *maritima;* Southern Pines, Enfield.
Truxalis brevicornis Linn.; Raleigh and westward.

Family Tettigoniidae.

Amblycorypha rotundifolia Scudder; Southern Pines, Blowing Rock and Waynesville.
Amblycorypha oblongifolia DeG.; Eastern section.
Amblycorypha uhleri Stal; Raleigh, Charlotte.
Atlanticus dorsalis Burm.; Southern Pines, Andrews and Waynesville.
Atlanticus pachymerus Burm.; Eastern section.
Camptonotus carolinensis Gerst.; Raleigh.
Ceuthophilus gracilipes Hald; Mountains.
Ceuthophilus heros Scudd.; Blowing Rock.
Ceuthophilus spinosus Scudd.; Southern Pines.
Ceuthophilus tenebrarum Scudd.; Southern Pines, Andrews, Grandfather Mountain.
Ceuthophilus uhleri Scudder; Raleigh.
Conocephalus brevipennis Scudd; Raleigh, Beaufort.
Conocephalus ensiferus Scudd.; Whole State.
Conocephalus fasciatus DeG.; Whole State.
Conocephalus saltans Scudd.; Raleigh, Hamlet, Southern Pines.
Conocephalus strictus Scudd.; Raleigh.
Cyrtophyllus perspicillatus L.; Raleigh and westward.
Neoconocephalus atlanticus Brun.; Raleigh.
Neoconocephalus bruneri Blatchley; Raleigh.
Neoconocephalus crepitans Scudder; Raleigh.
Neoconocephalus ensiger Harris; Blowing Rock.
Neoconocephalus fuscostriatus Redt.; Raleigh, Pantego.
Neoconocephalus hoplomachus Rehn and Hebard; Wilmington.
Neoconocephalus mexicanus Sauss.; Raleigh, Smith's Island.
Neoconocephalus palustris Blatchley; Raleigh.
Neoconocephalus robustus Scudder; Raleigh.
Microcentrum rhombifolium Sauss; Central section.
Microcentrum retinerve Riley; Stokes County.

Orchelimum agile DeG.; Mountains to Raleigh.
Orchelimum glaberrimum Burm.; Raleigh.
Orchelimum herbaceum Serv.; Smith's Island.
Orchelimum nigripes Scudd.; Raleigh.
Orchelimum nitidum Redt.; Eastern half of State.
Orchelimum volantum McNeill; Wilmington.
Pyrgocorypha uncinata Harr.; Raleigh.
Scudderia cuneata Morse; Raleigh, Highlands.
Scudderia curvicauda DeG.; Raleigh and westward.
Scudderia furcata Brunn.; Raleigh and westward.
Scudderia texensis Sauss.; Raleigh and eastward.
Symmetropleura modesta Brunn.; Raleigh, Southern Pines.

Family Gryllidae.

Anaxipha exigua Say.; Raleigh, Alamance County.
Anurogryllus muticus DeG.; Eastern section.
Cycloptilus americanus Sauss.; Raleigh and Alamance County.
Cycloptilus squamosus Scudd.; Raleigh, Beaufort.
Cyrtoxipha delicatula Scudd.; Raleigh and Granville County.
Ellipes minuta Scudd.; Raleigh and Southern Mountains.
Gryllotalpa borealis Burm.; Raleigh and westward.
Gryllus abbreviatus Serv.
Gryllus assimilis Fab.; Southeast.
Gryllus firmus Scudd.; Goldsboro, Southern Pines.
Gryllus pennsylvanicus Burm.; Whole State.
Gryllus rubens Scudd.; Raleigh.
Hapithus agitator Uhler; Raleigh.
Miogryllus saussurei Scudd; Pantego, Hendersonville, Raleigh.
Myrmecophila pergandei Bruner; Raleigh, Hendersonville.
Nemobius canus Scudd.; Raleigh.
Nemobius carolinus Scudd.; Raleigh westward.
Nemobius confusus Blatchley; Raleigh.
Nemobius cubensis Sauss.; Raleigh
Nemobius fasciatus DeG.; Mountains.
Nemobius fasciatus socius Scudd.; Raleigh eastward.
Nemobius maculatus Blatch.; Raleigh, Jefferson.
Oecanthus angustipennis Fitch; Raleigh westward.
Oecanthus exclamationis Davis; Raleigh.
Oecanthus latipennis Riley; Raleigh and westward.
Oecanthus nigricornis Walker; Mountains, Raleigh.
Oecanthus quadripunctatus Beut.; Whole State.
Orocharis saltator Uhler; Raleigh, Southern Pines.

Phylloscyrtus pulchellus Uhler; Waynesville, Raleigh and Granville County.

Xabea bipunctata (DeG.); Blantyre.

Summary,—Orthoptera of North Carolina.

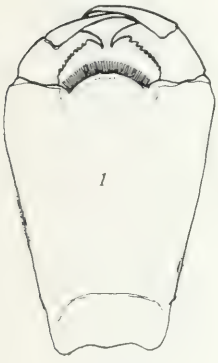
Family, Forficulidae	5 species
Family, Blattidae	11 species
Family, Mantidae	1 species
Family, Phasmidae	1 species
Family, Acrididae	69 species
Family, Tettigonidae	40 species
Family, Gryllidae	30 species
Total	157 species

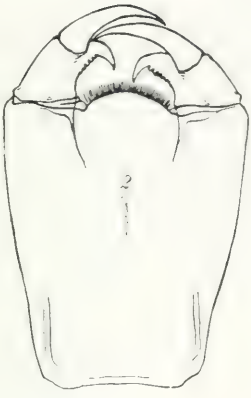
Notes on some Nymphs of Gomphinae (Order Odonata) of the Hagen Collection.

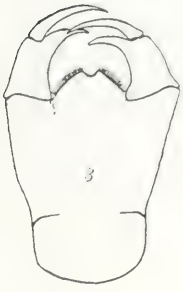
By James G. Needham, Cornell University, Ithaca, New York.

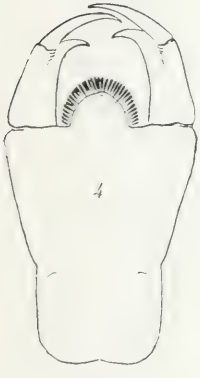
(Plate XIV.)

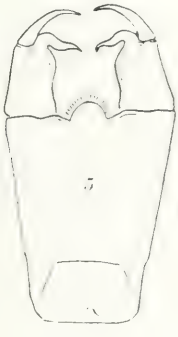
In 1904, while examining the dragonfly nymphs of the Hagen collection in the Museum of Comparative Zoology at Cambridge, I made some drawings and determinations of Gomphine nymphs which, upon Dr. Calvert's invitation, I now publish herewith. The figures are all of the nymphal labia. Cabot's excellent figures of the nymphs of his first paper (Immature stages of the Odonata, part I, Subfamily Gomphina. Mem. Mus. Comp. Zool. vol. II, No. 5, pp. 1-17, pls. I-III, 1872) are not sufficiently detailed as to labial structures to meet the descriptive needs of the present day. Hagen's later descriptions (Monograph of the earlier stages of the Odonata. Subfamilies Gomphina and Cordulegastrina. Trans. Amer. Ent. Soc., vol. 12,, pp. 249-291, 1885) were not accompanied by figures. Furthermore, it was a discovery of a later day that undetermined nymphs might be referred to their proper genera by comparison of the developing venation of the nymphal wing with the venation of the adult. Therefore, it is possible to add something to the

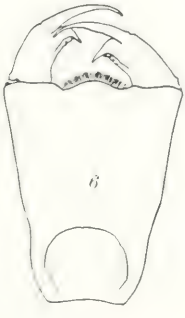


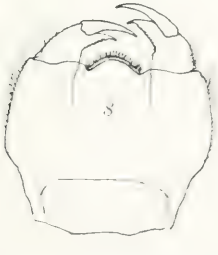












GOMPHINE NYMPHS—NEEDHAM.

knowledge left us by Cabot and Hagen by a re-examination of these interesting nymphs. The labial figures and descriptive notes offered herewith are to be considered as supplemental to Hagen's monograph, above cited.

Figure 1 is the labium of the nymph No. 1 of Cabot (l. c. Pl. 1, fig. 2) and No. 29 of Hagen (l. c., p. 272). It bears the M. C. Z. No. 443. It was at first referred doubtfully (Cabot l. c.) to *Herpetogomphus,* and later (Hagen l. c.) to *Epigomphus.* An examination of the venation of the developing wings reveals that it cannot belong to either of these genera, but it is probably a member of the not very homogeneous genus *Gomphoides* Selys (recently renamed *Negomphoides*) by Muttkowski (Bull. Mus. Milwaukee, vol. 1, p. 81, 1910).. The triangle of the forewing is three-celled, and the subtriangle is four-celled, there being two cells across the proximal end of it and two cells successively following, one triangular cell occupying its apex. The first and seventh antenodals are hypertrophied; ante-and post-nodals are 20 and 15, respectively. There is a strong brace vein to the inner end of the stigma, followed by five cross veins behind the stigma. There are seven cross veins at the bridge, one at the subnodus, four before it and two beyond it.

The labium of this nymph differs from that of *Gomphoides stigmatus* (Proc. U. S. Nat. Mus., vol. 27, p. 687, pl. 43, fig. 1, 1904) in having a slightly longer end hook upon the lateral lobe of the labium, and in having at the front margin of the rounded middle lobe, hidden among the bases of the fringing flattened hairs, two minute brown denticles. Probably here as in the better known genus *Gomphus,* the presence or absence of such denticles is merely a matter of specific difference.

Figure 2 is the labium of another species of *Gomphoides,* represented in the collection by a fragment of a cast nymphal skin. I was not able to identify it with any of the better preserved forms described by Hagen. The M. C. Z. number it bears is 436 and it bears the further label "Tapajos River, Brazil, Thayer Expedition, 1885."

The total length of the nymph would be about 23 mm.; the nine segments of the abdomen remaining measure 14 mm., segment 10 and the appendages being missing. The fore and middle legs are equi-distant at the base, the tibiæ are without burrowing hooks, the wing cases reach posteriorly to the middle of the fourth abdominal segment, there are sharp thorn-like lateral spines on abdominal segments 5-9, slightly increasing in length posteriorly, those of the 9th segment being about one-eighth as long as the body of that segment. There are dorsal hooks on segments 3-9, slightly diminishing in size posteriorly and becoming declined at their tips. The head is crushed and broken.

The labium of this species lacks the pair of brown denticles of the preceding species, but has the end hooks of similar form, larger than in *G. stigmatus.*

Figure 3 is the labium of Cabot's nymph No. 7, which was also Hagen's No. 28. The specimens were obtained from Ghugger Pir, Himalaya, India, through Rev. M. M. Carleton. They were referred by supposition to *Cyclogomphus,* and an examination of the developing venation, which is well preserved, confirms the supposition.

The shallow median cleft in the middle lobe of the labium, seems now less unique than when first described, since I have dscribed two forms with deeper division of it: *Phyllogomphus* (Proc. U. S. Nat. Mus. vol. 37, pl. 38, fig. 2) and *Gomphus dilatatus* (Bull. 68, N. Y. State Mus. p. 266, fig. 14). These three forms, however, have no near likeness to each other.

Figure 4 is the labium of the nymph that was Cabot's No. 11, which was also Hagen's No. 34 (l. c. p. 277). While labeling it "Gomphoides sp.," Hagen doubtfully refers it (or, at least the preceding very closely allied species No. 33) to *Cyclophylla;* and an examination of the developing venation shows that to that genus it undoubtedly belongs.

There is in each wing a single cross vein in the supertriangle; there is one in the triangle, but there is none in the subtriangle. There is an anal loop of two cells placed crosswise of the wing: the outer side of the triangle of the hind wing is angulated above the middle of its length, and all other characters are sufficiently in accord with the typical species of this genus.

The labium is remarkable for the semicircular outline of the middle lobe, and for the long fringe of flattened scales about its margin. The end hook of the lateral lobes is sharply incurved, the inner margin is smooth.

Figure 5 is the labium of an undescribed fragment of a nymphal moult, found in the bottom of a bottle with other specimens that were labeled "Tapajos River, Brazil, 1885." There was hardly more than the labium present, and nothing fit for description save the labium, but that is of so remarkable form, that it is worthy to be made known even though at present unidentifiable. Clearly it is allied with *Cyclophylla* by the form of the median lobe, but the sigmoid-uncinate end hooks of the lateral labial lobes are without a parallel among described forms.

Fig. 6 represents the labium of Hagen's Gomphus No. 14 (l. c., p. 262). It comes from Cairo, Ill., and has since been redescribed in Bull. Ill. State Lab. Nat. Hist. vol. 6, p. 82, 1901. It is clearly a *Gomphus,* and is chiefly interesting for the differences shown by the labium from other known members of that genus. The sharp straight end hook is set at a right angle with the body of the lobe, and close up under it are two or three teeth on the inner margin. It remains specifically undeterminable.

Figure 7 represents the labium of *Onychogomphus lineatus.* raised by Rev. M. M. Carleton, at Delhi, India, and determined by Hagen.. The labium is much like the labia of the closely allied and better known nymphs of *Ophiogomphus* and *Herpetogomphus* in having the middle lobe broadly rounded and the lateral lobes blunt and not pointed on the ends, but the terminal third of the lateral lobe is slenderer in *Onychogomphus* than in the other two genera.

Figure 8 represents the labium of an undetermined species of *Ictinus* from Middle Himalaya, India. Hagen had no doubt of the identity of the genus, nor have I, though there is no venational evidence to prove it. The labium is remarkably short and broad, the lateral lobes are pointed and serrate-toothed within, and the rounded middle lobe is fringed with a series of spines so remarkable in form that I have represented a few of them enlarged in figure 9.

A word or two may be added concerning the identity of two other nymphs described by Hagen. His Gomphus No. 2 (l. c.

p. 254) which he thought might perhaps "belong to some of the large Indian species, *Macrogomphus* or *Heterogomphus*" appears to agree well in venation with adult *Macrogomphus* in the Museum of Comparative Zoology. The following venational characters should enable any one with adequate material to determine (I have no specimen of *Macrogomphus* now in my possession). There is a basal subcostal cross vein, and the hypertrophied antenodals are the first and fifth in the fore wing and the first and sixth or seventh in the hind wing. There are no cross veins in any of the triangles, but there are three medio-cubital cross veins in the fore wing—two before the one forming the inner side of the subtriangle. Ante- and postnodals are 16:12 and 14:11 in fore and hind wing, respectively. There is a semi-circular, *Ophiogomphus*-like anal loop of two cells, with the cells of the anal margin before it irregular, and beyond it regularly arranged in double rows between the straight rear sectors.

Hagen's "Ophiogomphus" No. 10 can hardly belong to the genus *Ophiogomphus*, for the nymphal venation shows that the anal loop is composed of a single subquadrate cell, elongate in the axis of the wing and with parallel front and rear sides. The nymph also differs from the typical members of the genus in (*a*) absence of lateral spines from the abdominal segments, (*b*) in the flange that is developed upon the sides of the hind angles of the head, (*c*) in the spatulate flattening of the third antennal segment toward its tip, and the insertion of the minute fourth segment upon the inner angle of the tip, (*d*) in the straightness of the lateral lobe of the labium, and (*e*) in the length of the tenth abdominal segment, it being hardly shorter than the ninth segment.

Explanation of Plate XIV.—Labia of Gomphine nymphs. In all, the inner aspect of the mentum, and parts distal thereto, are shown.

Fig. 1. *Gomphoides* species. Brazil.
Fig. 2. *Gomphoides* species. Brazil.
Fig. 3. *Cyclogomphus* species. India.
Fig. 4. Unknown genus. Brazil.
Fig. 5. *Cyclophylla* species. Brazil.
Fig. 6. *Gomphus* species. Illinois.
Fig. 7. *Onychogomphus lineatus*. India.
Fig. 8. *Ictinus* species. India.
Fig. 9. Part of the spinulose border of the middle lobe of the same.

Notes on Nephelodes Guen. (Lepid.).

By F. H. Wolley Dod, Millarville, Alta., Canada.

Of the three names standing as species of this genus in Prof. Smith's Check List, reference to *minians,* Guen. and *pectinatus,* Smith, are given in Dr. Dyar's catalogue. The type locality of *minians* I don't know, but it is believed to be eastern. *Pectinatus* was described from two males from Corfield, Vanc. I., and "B. C.," and said to resemble *minians,* but to differ in having the antennal branches longer and slightly thickened at the tip, and lacking bristles. Later Prof. Smith described *tertialis* from seven males and a female from Winnipeg, and stated that it was decidedly smaller than *minians,* with more even fringes, lacked an obvious median shade on the primaries, and differed in male genitalia (Journ. N. Y. E. S. xi. 19, 1903). The genitalia of all three species are figured on Plate III of Trans. Am. Ent. Soc. xxix, of the same year. Whether the differences shown indicate the existence of three biologically distinct species, is a matter for future investigation.

Sir George Hampson recognizes the genus, including in it besides our three names as species, two more from Tibet. These latter are by themselves in Section I. "Male antennæ bipectinate to apex, the branches long." Section II contains *tertialis* and *pectinata,* "male antennæ bipectinate with moderate branches with short bristle at extremity. The two he separates in a table thus, "Hind wing white, the terminal area tinged with brown . . . *tertialis,*" and "Hind wing wholly suffused with brown . . . *pectinata.*" He figures a male co-type of the former from Winnipeg, and mentions having a male from Colorado as well. Of *pectinatus* he gives a wood cut, listing four males and a female from Vancouver Island. Section III, "Antennæ of male bipectinate, with short branches with long bristle at extremity," is devoted to *emmedonia,* Cram., which, described in 1779, he makes a prior name to *minians* Guen., giving as other synonyms the names so standing in Smith's Catalogue, except that he removes *sobria* Walk., to a smooth-eyed genus in the next volume, and here

adds *Monosca subnotata* Walker, a change which Prof. Smith accepts. He makes *violans* Guen., of which he has a type from "Eastern States" "Ab. 1 * * * more purple, and without the red tones." He shows a wood cut of the species, but in it the antennal branches appear longer, and the bristles shorter, than in the cut of *pectinata* on the opposite page, in contradiction to the tables. In fact, in his detail of *pectinata* the antennal branches are shorter and bristles proportionately much longer, than in any B. C. specimen that I have seen.

In Can. Ent. XXXVII, 179-180, May, 1905, I published a somewhat extensive note on these forms, in which some antennal variation was suggested, and stating that my only Winnipeg specimen of authentic *tertialis* was inseparable from some Eastern specimens superficially.

When at Prof. Smith's collection I noted a male and female type and male co-type of *tertialis,* and wrote: "Pectinations longer than *minians,* and as long as *pectinatus,* with bristles as in *minians.* A very good species." And later at Washington, I wrote of a male co-type and another Winnipeg male, "Antennæ bipectinate with long branches as in *pectinatus,* but bristle longer than in *pectinatus,* not as long as *minians.*" My conclusion as to the validity of the species was based solely upon the antennal structure. Whilst with Mr. Wallis at Winnipeg a few weeks before, I had noted that from an examination of the antennæ of his *Nephelodes* it seemed he might have more than one species. And at Rutgers College and other collections I frequently noticed, in several other genera, rather striking different relative lengths of antennal serrations or pectinations in specimens which appeared otherwise exactly alike, and called Prof. Smith's attention to it. The length of serrations or pectinations is often, undeniably, a valuable aid in separating closely allied species. But in the case of *Nephelodes,* as in some others, I gradually became very suspicious. At my request Mr. Wallis kindly sent me all his material in this genus for study. Most, as he regretted, were in bad condition, but served my purpose perfectly well. These, added to my own material from various localities totalled 59 males and 15 fe-

males, over which I spent an entire day, chiefly examining and most carefully comparing the antennal branches and bristles.

Four males from New Brighton, Pa., are the largest and brightest colored that I have from anywhere east of the Rockies. These have antennal branches about the length of the width of the shaft, narrowly stalked, though, except in one specimen, slightly enlarged at tips, from which spring single bristles about equal in length to the branches.

Nine from Chicago show a gradation from branches not exceeding width of shaft, with bristles of equal length, the joints being well marked by branches being a little thickened at their bases, to others with branches longer than width of shaft, with joints of shaft not marked, and the branches uniform throughout their length, or else a little thickened at tips. In some the branches are as long as, or longer than, some Vancouver Island *pectinatus,* but less thickened at tips and with longer bristle. In others the branches are shorter than in the New Brighton specimens. Occasionally two bristles spring from the tip of a branch, one a little longer than the other, and the bristles are not always as long as the branches. Eight other males from scattered localities in Illinois, from Elmwood, R. I., and Sudbury, Ontario, show similar variation to the Chicago specimens. Such malformations occasionally occur as in other species with pectinate antennæ, as two branches being united by a membrane, or one springing from the stem of another.

Three from Winnipeg have pectinations of three different lengths. In one they are as short as in the New Brighton specimens, and the shortest from Chicago, with bristle as long or nearly as long as branch, and thickened at base rather than at tip. In the other two they are longer but of different lengths, in one as in the longest from Chicago, not thickened at base, with bristle not much more than half the length of branch, and a little, though not much longer than in *pectinatus* from Vancouver Island. The last two specimens are typical *tertialis,* and from type locality. Thirteen males from Husavick and Winnipeg Beach, close together and about 50

miles north of Winnipeg, show the same antennal variation, and grade easily through. The branches are usually slender and of about even thickness, but are sometimes thickened at bases, or slightly at tips. The bristles are usually, but not always shorter than the shortest in the Chicago examples.

Two from Aweme, Man., one from Regina, Sask., and seven from Calgary, all have branches considerably longer than width of shaft, but in some not a bit longer than in some Chicago and east coast specimens, though the bristles in all seem shorter. The tendency to a thickening at the base of branches seems to have diminished in these, and they are generally thickened at tips. Ten from Vancouver Island and two from Glenwood Springs, Colorado, do not differ from these in antennæ, but the Vancouver Island specimens, especially those from Duncans, are more robust, and darker in color throughout.

Excepting perhaps the strongly colored New Brighton specimens, there is little difference in the range of color and maculation between series from the different localities from the east and as far west as Winnipeg. Some of the more eastern specimens possess slightly scalloped margins, in a varying degree, and sometimes not at all. The tendency is less noticeable in Winnipeg specimens, in which a very distinct median shade is just as often present as in the others. Winnipeg specimens average distinctly smaller, as is quite usual with prairie forms, and there is a distinct tendency towards paler and more whitish secondaries. But this again is an evanescent character. In Alberta the colors usually run paler, and a pinkish or somewhat carneous suffusion is not unusual. On the whole, the color of the secondaries here is still a little paler. The palest specimen of any I have, both as to primaries and secondaries, is from Calgary, and, as it happens, one of the very darkest is from Winnipeg. My Colorado specimens resemble some from Calgary more closely than any others.

On Vancouver Island (*pectinatus*) the build is somewhat stouter than on the prairie, but scarcely more so than in the

east, if at all. The wings have a rougher appearance. Olivaceous and red shades predominate to the exclusion of purple, and the secondaries in all my specimens are almost uniformly dark fuscous, darker than in eastern specimens, and lack the bronzy sheen and pink fringes so often found there.

I recently sent Sir George Hampson a Calgary specimen as *pectinatus*. He commented that it was "*tertialis*, not *pectinatus*." In so far as the color is concerned he is perfectly correct, and I quite admit that the Calgary form is *tertialis*, which appears to me to intergrade with *emmedonia*. As to whether *pectinatus* is really a biologically distinct entity, not habitually interbreeding, somewhere or other, with the same form, that is to say, whether a distinct racial connection will not ultimately be found to exist between the extremes referred to in this article as North American specimens, is a matter of some doubt. What I have been able to observe from the data at my disposal suggests to me that they are not distinct. For the present, not being able to trace an actual connection through, and possessing no specimens from anywhere between Calgary and Victoria, I feel bound to leave the name *pectinatus* as it stands. I should mention that I have females from most of the above mentioned localities, and that they do not differ essentially from the males except in having minutely ciliate antennæ.

Of all the seventy-four specimens examined, I have discovered a single but unmistakable spine on a single hind tibia of two, one male and one female, from Husavick, Man. It is situate in both on the outside of the limb, in distance about midway between the two pairs of spurs. Though at present I have investigated very little in the matter, I know of a number of species in which the presence or absence of tibial spines is variable, but this is the first instance in which I have discovered any on tibiae of a hairy-eyed species. The only other hairy-eyed species in North America that is known to have spined tibiae is *Trichorthosia parallela*.

Studies on Costa Rican Odonata.

II.—The Habits of the Plant-dwelling Larva of Mecistogaster modestus.*

By Philip P. Calvert, Ph. D.,
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Announcement has already been made in the News (Calvert 1910 *a* and *b*) and elsewhere (Ibid., 1909 *c*, 1911) of the discovery, in Mexico by Mr. F. Knab and in Costa Rica by the writer,

Two epiphytic Bromeliads on a branch of *Erythrina*, Cartago, Costa Rica, July 4, 1909. Photograph by Amelia S. Calvert.

of Odonate larvæ living in the water which collects between the bases of the leaves of Bromeliads growing upon trees, and of the rearing of the imagos of *Mecistogaster modestus* Selys from these larvae.

*Number I. on The Larva of Cora, was published in Entomological News XXII, pp. 49-64, plates II and III, February, 1911.

The pineapple is the most familiar example of this family of plants, although, of course, it is not an epiphyte. The epiphytic bromeliads of Costa Rica, in addition to the Tillandsiae, pertain to the genera *Androlepis, Aechmea, Billbergia* and *Pitcairnia,* according to Wercklé (1909). Their range is from sea-level to the craters of such volcanos as Irazu (11,000 feet, 3300 metres), but they are most abundant in the moister parts of the country. To the naturalist traveling along the usual route from Limón to San José, the most striking difference between the almost constantly moist Atlantic slope and the Pacific side, with its definite dry season, is the much greater number of bromeliad and other epiphytes on the former.

On the pruned trees of the poró (*Erythrina*) and other species which form the *cercas* or hedges, surrounding the fields and pastures near Cartago (Atlantic slope), bromeliads with leaves five to ten inches (12.5-25 cm.) in length are extremely abundant. They frequently but not invariably contain water and usually harbor some insects, especially Blattidæ, but they never furnished any Odonate larvæ, nor were imagos of *Mecistogaster* ever met at this altitude (4750 feet, 1450 metres), in our experience.

Epiphytic bromeliads of greater size (*i. e.,* with leaves two to three feet, 60-90 cm., long) occur in forests both below and above this elevation, but our collections of Odonate larvæ from them, as well as our observations of *Mecistogaster* adults, were made at altitudes lower than 3300 feet (1000 metres). The leaves of these plants spring from such a very short stock that their bases are close together and the blades of the leaves in contact with each other for several inches. As a general rule a number of stocks grow side by side on the same host tree, whose trunk or branch they may completely encircle, and as the stocks may be attached to each other it is not easy to separate one individual plant from its fellows. The leaves, with the length mentioned, taper from base to apex, diverge from their fellows and either stretch up stiffly for their entire length or droop over gracefully near their tips; owing to their stiff-

ness and their serrated spiny edges, they must be handled carefully to avoid scratched and bleeding hands. The stocks are attached to the host trees at very varying distances from the ground—from less than a foot to more than fifty feet (15 metres).

On account of the size and formidable defenses of these plants, it was our usual practice to select those whose attachment was not more than fifteen feet above the ground, throw a long rope over one or more stocks, pull on both ends of the rope so that it would slide between the tree trunk and the bromeliad and break the roots which fastened the latter to its host. Some water and some of the most active insect inhabitants of the epiphyte would be lost in this operation. As soon as the bromeliad reached the ground, it was placed with its crown of leaves directed upward and the upper parts of the leaves cut off with a knife to get rid of the inconvenience of the spines. Beginning with the outermost leaf of the whorl, the leaves were removed one by one, carefully stripping each to its attachment to the stock and taking out the animals lying between the leaf bases with a forceps and placing them in bottles.

The first time that I found bromeliadicolous Odonate larvæ was October 3, 1909, at Juan Viñas, Costa Rica. Three distinct clumps of epiphytic bromeliads had been examined without success that day, at different points along the road and trail which leads from the railroad station down to the iron bridge over the Rio Reventazon. To quote from our diary: "The fourth and last bromeliad was in the forest about 200 feet above the river and 10-12 feet above ground on a tree trunk. * * * After half an hour's tugging and pulling, the mass, consisting of three plants and weighing surely not less than fifty pounds, fell to the ground. I cut off the leaves as before and very soon found a dragonfly larva between the bases of two leaves not many leaves in from the circumference. In the hour I remained after the plants fell, no other larvæ were found and there was much still to be examined, so I left the plants where they had fallen. At 9 A. M. [Oct. 4] I resumed

cutting off leaves as before, and when I had removed all the larger ones I carried the three stocks, still so firmly united that I was unable to separate them with my little knife, and weighing fifteen pounds or more, to a spring farther down the canyon side so that I might wash out the mud when necessary to make more careful search. In all the bromeliads examined these two days there was much mud between the leaves, chiefly the outer ones, as well as dead leaves of trees which have fallen from the above or, perhaps at times, have been carried in by wind. At noon—after three hours' constant work—I finished the examination and had found two more dragonfly larvæ."

This clump of bromeliads was tenanted, in addition to the Odonate larvæ, by a young scorpion (*Centrurus margaritatus* Gerv.) two inches long, which had just moulted, the exuvia also found; two species of Phalangids (*Metergimus signatus* Bks., *Cynorta* sp.), a Pseudoscorpion (*Chelanops* sp.), and Coleoptera, both adults (*Metamasius dimidiatipennis* Jekel; *Alegoria dilatata* Castelnau; *Cryptobium* sp., or genus allied thereto; an Endomychid genus, new, near *Trochoideus; Cercyon* or *Phaenonotum* sp.; and *Phaenonotum tarsale* Sharp) and larvæ (Elaterids, probably of the genus *Semiotus* and others allied to what is considered the larva of *Dolopius;* a Lampyrid of an unknown genus, but apparently related to *Photuris;* a Sphæridid, possibly *Phaenonotum tarsale*) a Dipterous larva (Stratiomyid) with a circle of setæ at its hind end; two Heteroptera, the subglobular shiny *Chlaenocoris dissimilis* Dist. and a flat nymph of (probably) *Belminus rugulosus* Stal; a Hepialid caterpillar; a small earwig ("too immature to be determinable; probably it is a *Labia,* possibly *L. annulata* Fabr."); ants of an undescribed species of *Apterostigma.* The weevil, *Metamasius dimidiatipennis,* bore many Acari (a species of *Uropoda*) on its legs, and another larger Acarine (*Celanopsis* sp.) was present between the leaves; finally in the mud between some of the leaves was a fair-sized earthworm (an immature *Andiodrilus biolleyi* Cog. di Mar.) quick in its move-

ments and with a peculiar smooth proboscis which was frequently thrust out and looked like a spine.*

Of all these inhabitants of the bromeliad, the Pseudoscorpion, the flat Reduviid *Belminus* and the Elaterid larvæ referred to *Semiotus* (?) appear to possess the most adaptive body form, *i. e.* flattened to correspond to the crevices between the broad leaf bases. This is best marked in the *Semiotus* (?) larvae which measured 1—1½ in. (25-40 mm.) long, one-quarter inch or more (5 + mm.) wide and less than one-eighth inch (< 3 mm.) in thickness.

The list here given of the cotenants with the Odonate larvæ does not include by any means all the *bromeliadicoli* which we met in Costa Rica, but is interesting as giving a glimpse of the organic environment of the special subject of this paper.

Again at Juan Viñas, on December 17, 1909, we pulled down a large epiphytic bromeliad from about 12 feet above ground, "although it took all our combined weight and strength to do it and were rewarded by finding seven or eight good specimens of Odonate larvæ of different sizes. This bromeliad had, among other animals, a few of the large black ants, *Odon-*

*Specimens of the bromeliadicoli were submitted to specialists and I acknowledge with thanks the identifications of the earthworm by Dr. J. Percy Moore, of the ants by Prof. W. M. Wheeler, of the earwig by Dr. Malcolm Burr (through Mr. J. A. G. Rehn), of the Arachnida by Mr. Nathan Banks, of the Coleoptera by Mr. E. A. Schwarz, of the Heteroptera by Mr. O. Heidemann and of the Lepidopterous larva by Dr. H. G. Dyar. The identification of the last four named groups was arranged by Mr. Frederick Knab, who himself determined the Stratiomyid larva.

Of the ant *Apterostigma* sp., Prof. Wheeler, after examining these specimens and also others from Costa Rica *not* collected in bromeliads, wrote: "It is a fungus growing ant of the most primitive and, at the present time, most interesting genus of Attii. No species of this genus has ever been taken in Bromeliads. All of the known species have been described from cavities in rotten wood where they build a peculiar fungus garden using caterpillar excrement as a substratum, and enveloping the whole garden in a mycelial web which is not known to exist in any of the other genera of Attiine ants." Since, as stated above, a caterpillar also lived in this same clump of bromeliads, doubtless the usual living conditions of *Apterostigma* were satisfied here.

tomachus hastatus Fabr., with enormously developed jaws, bent near the tip, which are carried wide open and measure one-quarter inch from tip to tip; occasionally they would be snapped shut with a very audible click."* We were by no means always successful, however, either in finding Odonate larvæ in bromeliads or in pulling down the plants from the trees, as records in our diary for La Emilia in November, 1909, and at Juan Viñas in February and March, 1910, show. Our last collection from them was on April 26, 1910, when we examined clumps of bromeliads on trees near the edge of a clearing about 100 feet below the railroad tracks west of Juan Viñas station, altitude about 3200 feet. Here we "found a few larvæ of *Mecistogaster* with the accompaniment of spiders, cockroaches, mosquitoes, slugs, planarians, earthworms and big-jawed ants." Among the *Mecistogaster* larvæ was one smaller than any we had previously found and I carelessly did not immediately separate it from its larger brethren; when I turned to do so it had disappeared, and we had no doubt that it had suffered from the cannibalistic habits of all its tribe.

The fate of our bromeliadicolous Odonate larvæ was as follows. The three of October 3-4, 1909, reached our headquarters at Cartago alive and were placed in separate glass tumblers, each containing a little water and a miniature bromeliad from the neighboring *cercas*. They were fed with, and were seen to eat, smaller dragonfly larvæ. The larva of Oct. 3 (No. 49) died in the act of moulting, Oct. 8, being unable to cast the skin from its head and especially the mask. One of those of Oct. 4 died from some unknown cause and its hinder parts were eaten by its companion before separation; the other (No. 48) moulted between Oct. 15 and 24, while we were absent, and again on Dec. 25, but died Dec. 30-31.

The larvæ obtained Dec. 17, 1909, were similarly arranged at

*Commenting on specimens of this species, Prof. Wheeler wrote: "I find in my collection a series of specimens taken in bromeliads at Alto de Serra in the Province of São Paulo, Brazil, by von Ihering. Apparently it has a habit of nesting in such places." We found it in a number of bromeliads in Costa Rica.

Cartago, but were supplied more often with Chironomid larvæ; they did not seem as voracious as most Odonate larvæ are. They were numbered 54 to 61. No. 54 died Jan. 3, 1910. No. 55, without further moulting, transformed April 6 as *Mecistogaster modestus* ♂. No. 56 died in attempted transformation April 11. No. 57 probably moulted Jan. 19-29 during our absence and transformed April 18 as *Mecistogaster modestus* ♀. No. 58 moulted and died Jan. 19-29. No. 59 moulted Dec. 25 and transformed April 4 as *Mecistogaster modestus* ♀. No. 60 probably moulted Feb. 15-18 during our absence, as fragments of an exuvia were found Feb. 19; moulted March 29-30 and was found dead April 3. No. 61 moulted Jan. 7-16 and again March 13-16 and was lost probably in the earthquake of May 4, as we have no record for it later than March 16.

The larvæ of April 26, 1910, (Nos. 1-3) were at once preserved in alcohol, as were the pre-metamorphic exuviae and the dead larvæ resulting from our collections of Oct. 3-4 and Dec. 17, but not all the exuviæ have been available for the present study.

Our diary for April 28, 1910, at Juan Viñas, records: "We went down the road to the river [Reventazon] * * * At the bromeliad cluster* from which we obtained the larvæ on December 17 last, from which *Mecistogaster modestus* transformed in our room at Cartago this present month of April, a single male of this species was sitting on the tip of a leaf and was easily caught with the net. Before reaching this tree we passed another also with bromeliads of an apparently different species. Around these bromeliads two females of *M. modestus* were fluttering and alighting and altho' we did not see them making any motions of oviposition, one of them disappeared into the leaf bases as if she might be on such an errand. On the outside of one of the yard-long leaves, about six inches from the apex, was an exuvia of *modestus* which we were able to get." The diary for May 1, 1910, reads: "Went down to the Revent-

*In December we had pulled down some, but not all, of the stocks forming this cluster, leaving the others as a control.

azon. As I passed the cluster of bromeliads around which two females of *Mecistogaster modestus* were seen flying by us on Thursday, a female of this species was transforming on the outside of a leaf. I was able to secure both her and her exuvia [8.30-9 A. M.]." "All these observations show that in spite of their unnatural surroundings and perhaps lower temperature, our larvæ at Cartago were not retarded in their development as compared with their free relations in their native forest."

The origin of the bromeliadicolous habit of the larvæ of *Mecistogaster modestus* may possibly be accounted for in the following manner. The majority of the species of *Mecistogaster* are South American and some of them occur along the Amazon, where also are the headquarters of the Bromeliaceæ (Wittmack 1888, p. 39). As is well known, "thousands of miles of forest" along this river are inundated in each wet season, so that a person "will travel through this forest for days, scraping against tree-trunks and stooping to pass beneath the leaves of prickly palms, now level with the water, though raised on stems forty feet high." (Spruce, 1908, vol. I, p. 229; Wallace, 1853 etc., chap. vii). At such periods of high-water, epiphytes, whether of the Bromeliaceæ or of other families, would often be just at the water's surface, or only slightly submerged, and would offer to Zygopterous Odonata quite ordinary and usual places for oviposition. An association with certain plants might thus be formed by *Mecistogaster* or its ancestors, which would persist even when the water-surface was much below the level of the epiphytes. Only such plants as could retain water for long periods of time (weeks and months) would permit the development of essentially aquatic larvæ and the water must be renewed from time to time. This last condition would prevent the survival of *Mecistogaster* wherever the rainfall was too intermittent. Once the association of this insect with bromeliads,† or any other suitable plant, were formed it might persist with the spread of the insect away from the regions of deep yearly inundation (the Amazon or elsewhere), where we conceive its

† It is suggestive that the legion Pseudostigma Selys, to which *Mecistogaster* belongs, and the Bromeliaceae are confined to tropical America.

possible origin to have occurred, to the forest at Juan Viñas where the trees which harbored our larvæ were far, far above the highest flood marks of the Rio Reventazon. *M. modestus*, *M. ornatus* and *Megaloprepus coerulatus*, as we saw them in Costa Rica, usually fly above the underbrush and when disturbed, rise to a height of many feet above the ground.

The excessively long abdomen of the adults of *Mecistogaster* and its allies (*Megaloprepus, Microstigma, Pseudostigma, Anomisma*) may be a special adaptation to the life of their offspring in water-containing plants, since the abdomen of the larva of *M. modestus* is no longer, proportionally, than in other Agrioninæ. The space between the leaf of a bromeliad and the leaf next without decreases downward, and if *Mecistogaster's* eggs are deposited in the plant tissue in or near the contained water, in accordance with the general habit of the Zygoptera, it would often be necessary for the female to reach far down into crevices possibly too narrow to admit of the entrance of her thorax and wings. The long abdomen with the ovipositor near its hind end would therefore be of distinct advantage, and it will be a matter of great interest to ascertain, by future observations, if the lengths of abdomens seen in various members of the legion Pseudostigma of de Selys are correlated with peculiarities in length in the plants or other objects in which they oviposit.

(The larva and transformation of *M. modestus* will be described and figured in Number III of these Studies.)

Supplementary Note on Plant-dwelling Odonate Larvae.—In addition to the records of plant-dwelling Odonate larvae already mentioned in the NEWS (Calvert, 1910 *b*), Mr. Frederick Knab has called my attention to a paper by G. F. Leicester (1903), containing the following statements: "One of the most important breeding places [for mosquitoes] in the jungle is the water which collects in the bamboo, either in the stumps of old bamboo or in the cavities of fallen bamboos which in some cases have cracked in drying and allowed water to accumulate in them, or even in standing living bamboos in which some insect has bored a hole in the stem and allowed water to enter (p. 291). * * * Other natural enemies [of mosquito larvae living in the same places, in addition to the carnivorous mosquito larvae *Megarhinus*] are the larvae of certain species of Agrionidae, Libellulidae and Chironomidae." (p. 292).

LITERATURE QUOTED.

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Ibid.—1910 *c*. Zoological Researches in Costa Rica. Old Penn Weekly Review of the University of Pennsylvania, IX, pp. 165-170. Nov. 12. With figure (p. 167) of the fully-expanded *Mecistogaster modestus* and its exuvia. The remarks on *Mecistogaster*, but not the figure, were reprinted in Entom. Mo. Mag. (2) XXII, pp. 17-18. Jan., 1911, under the title "Dragonflies breeding in rain-water collected at the leaf-bases of Bromeliads," with comments by G. C. Champion.

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A Bromeliadicolous Caddis-worm.—*Apropos* of the article on bromeliadicolous dragon-fly larvae in this number of the News, the following item from a letter from Mr. K. J. Morton, of Edinburgh, Scotland, is of interest: "Longer ago than I care to think, Fritz Müller, amongst other curious habitations of Trichopterous larvae, sent me some caddis cases taken from the water present between the sheaths of Bromeliads found on trees in the primeval forest growth of Southern Brazil."

The Occurrence of the Trichogrammatid *Ufens niger* (Ashmead) in Texas.—Records concerning even the most common species of Trichogrammatidæ are rare and it is meet therefore to publish the following: A single male specimen of *Ufens niger* (Ashmead) was captured by C. A. Hart at Brownsville, Texas, July 9, 1908, by sweeping grass. The specimen has been remounted in xylol-balsam from alcohol and deposited in the collections of the Illinois State Laboratory of Natural History, Urbana, Ill., as accession No. 45,113.—A. A. Girault.

New Species or Sub-species of North American Butterflies (Lepid.).

By Henry Skinner, Philadelphia, Pa.

Eresia texana seminole n. subsp.

Male and female. Base of the primary wing fulvous, with a black ring containing a fulvous spot; in the discal cell outward is a large fulvous spot encircled with black and beyond this a black space with a yellow dot in the center; further toward the apex is a lunate fulvous spot. Below the cell, near the base are three fulvous dots. All the other spots on both wings are yellow; the mesial band on secondaries yellow, large and more nearly quadrate than in *texana*.

Described from two specimens (male and female) in the collection of the Academy of Natural Sciences of Philadelphia and a number of paratypes in the collection of the Georgia State Board of Entomology at Atlanta. The specimens were taken by Professor J. C. Bradley, at Bainbridge, Georgia, Sept. 17th. It is named from the aborigines that inhabited that district as suggested by Professor Bradley.

Pamphila sassacus dacotae n. subsp.

The stigma of *dacotae* is like that of *sassacus*, but the markings of the male in most specimens are nearly obsolete; the small black dash seen in *sassacus* beyond the stigma is wanting in *dacotae*. In color the new form is paler, and this in conjunction with the lack of maculation gives it a peculiar appearance. The female is more differentiated from *sassacus* than the male, being entirely fuscous; there are three small sub-apical spots, two at the end of the cell and two below these, and the latter in one specimen are translucent; further toward the outer margin are two more spots. There is a faint semi-circular band of spots in the center of the secondaries. All these spots are repeated on the underside.

Described from five specimens from Volga, South Dakota, and five from Grinnell, Iowa. Type locality Volga. The insect flies in July and August (July 16-21, Aug. 24th.)

Pamphila mystic pallida n. subsp.

Like the Eastern *mystic* but much paler in color, especially the fuscous border of the wings.

Described from a number of specimens of both sexes from Volga, South Dakota. Taken in July, from the 16th to the 25th.

Pamphila sylvanoides utahensis n. subsp.

Larger and paler in color on the upper side than *sylvanoides*. Under side paler than the typical form with the maculations of the secondaries white. The color of the under side has a pronounced greenish tinge.

Type locality, Park City, Utah, July 20th. Also from Beaver Canyon, Idaho, July 23rd, and Grizzly Mountains, Colorado, July 2nd. This is a very distinct topomorph.

Pamphila pawnee montana n. subsp.

Size and shape of *pawnee*, with same character of stigma but much darker in color, with a wide fuscous border to all the wings. Under side much darker than in *pawnee*, with a basal yellow dot on the secondaries and a row of five yellow spots outside of the center and parallel to the outer margin.

Described from eleven specimens from Colorado, taken by David Bruce. Only two specimens out of the lot have exact data; one says Chaffee County, 7500 feet alt., and the other Salida, May 21st, 7500 feet alt.

Pamphila quinquemacula n. sp.

Male. Expands 21 mm. Upperside. Primaries fuscous with five very small, distinct white spots, three of them subapical, one below these and situated nearer to the outer margin, and one below the end of the discal cell. Secondaries fuscous and immaculate. Underside. Primaries as above; secondaries with two very distinct, comparatively large white spots, about an eighth inch apart, near the costal margin and about eight minute white points scattered across the central area of the wing.

Fringes, palpi and pectus white.

From one specimen taken at Las Cruces, New Mexico, probably taken by Prof. T. D. A. Cockerell. It is allied to *fusca* Grote and Robinson, and *osyka* Edwards. This is the smallest species so far found in the United States.

The types of all these new forms are in the Academy of Natural Sciences of Philadelphia.

Dr. Creighton Wellman, whose entomological work in tropical Africa will be recalled by readers of the NEWS, is now Director of the Laboratory of Tropical Medicine, at Tulane University, New Orleans, La.

Adelpha (Heterochroa) bredowi and californica (Lepidoptera).

By Henry Skinner, Philadelphia, Pa.

These two species have been considerably confused in the literature of the subject. Some authors have placed *californica* as a synonym and others have confused the two. I had never carefully studied them and had supposed that *californica* was only a slight race of *bredowi* without any constant character or characters to separate it. We lately received some specimens from Texas, collected by Mr. H. A. Wenzel, and in deciding which name to place them under, I was led to examine the material at my comand, which consists of twenty-nine specimens from a number of localities.

Bredowi was described by Hubner, Zutr. Exot. Schmett. f. 825, 826. The Biologia Centrali-Americana gives the following distribution for it: Arizona; Chihuahua, Oaxaca, Mexico; San Geronimo, Polochic Valley, Santa Rosa in Vera Paz, Guatemala. *Limenitis eulalia* Doubl. Hew., Gen. Diurn. Lep. t. 36, f. 1 is placed as a synonym.

Heterochroa californica was described by Butler, Proc. Zool. Soc. Lond., 1865, p. 485, with the habit given as California. It is figured by Edwards in his Butt. Nth. Amer. 1. pl. 44, 1870, under the name *bredowi*. Mr. Edwards corrected this reference in his Catl. of 1884, and gives the habitat as Cala.; Ariz.; Nev. It is also figured in Holland's Butterfly Book and in Wright's Butterflies of the West Coast.

Godman and Salvin mention the *californica* of Butler in the Biologia and say several small differences serve to distinguish it from *bredowi*, the latter being recorded from Arizona, from specimens collected by Morrison. At the end of his description of *californica* Mr. Butler says it is closely allied to *bredowi* and then points out a number of differences between the two. Of these I have found but one that is constant in the specimens examined—"the basal upper half of the hind wing is crossed by an additional short orange band."

On the under side of the secondary wing there is a broad

white fascia, edged narrowly by a black line, and interior to this in the basal upper half wing, is a blue fascia narrowly lined with black, and still nearer the base is an orange brown fascia edged with black and the base of the wing is blue. In *californica* the first blue fascia is replaced in its lower half by an orange brown spot and this spot is separated on its lower half from the inner orange brown fascia by a blue space.

These maculations of the upper half of the hind wing basally are very marked and serve to sharply separate the two species. If intergrades occur I have not seen them.

Another character of moment is found in the border of the under side of both wings. In *bredowi* there are two rows of submarginal lunules; the outer ones narrow and the inner ones three times the width of the outer ones. In *californica* the outer row of lunules is absent or only faintly indicated.

None of the markings of the upper side of the wings serve to differentiate the two forms.

The following are the records: Four specimens of *californica* (presumably from California); four specimens from California (no exact data); one from the San Bernardino Mountains, Cal.; one from Los Angeles, Cal.; one from Tehachapi, Cal., July 6th; one from Havilah, Cal., June 17th; two from Ashland, Oregon, Sept. 7th and 30th.

Nine specimens of *bredowi,* Carr Canyon, Huachuca Mountains, Arizona, Aug., taken by myself; one from the City of Mexico and three taken by H. A. Wenzel in the Chisos Mountains, in southern Texas, July 22nd.

THE COTTON MOTH IN LARGE NUMBERS.—From September 23rd to the 26th, Philadelphia experienced a large flight of the cotton moth, *Aletia argillacea.* They swarmed in some parts of the city and hundreds were resting head down on the electric light poles and on plate glass windows of stores. There were many thousands of them and nearly all that I saw were in perfect condition as though just from the chrysalis. These moths are known to migrate in numbers, but it is quite strange if the great numbers seen here came from the cotton districts in the south. The moths in some places appeared to create considerable alarm, people thinking they would cause damage to plant life here.—HENRY SKINNER, Philadelphia.

On two Species of the Berytid genus Capyella Bredd. (Rhynch.).

By E. Bergroth, Fitchburg, Mass.

Capyella novella n. sp.

Castaneous, frontal spine pale testaceous, apex of second and third antennal joint and female genital segments black, fourth antennal joint white with the apex fuscous.

Head with the anteocular part as long as the postocular part, seen from the side moderately sloping (45°) and obliquely truncate at apex, the tylus being straight; frontal spine rather long, slightly curved downwards; bucculæ high, a little prominent apically; rostrum almost reaching hind coxæ; antennae very much longer than the body, first joint as long as second and third together, passing middle of abdomen, its apical club elongate, second and third joints slightly thicker at apex, third twice longer than second, fourth shorter than second.

Thorax thickly and strongly punctate, more finely so on anterior lobe of pronotum, which is a little sunken and rounded posteriorly and less than half the length of the posterior lobe, pronotum with the sides a little rounded, slightly obtusely gibbous at the posterior angles, the median longitudinal elevated line not higher between the shoulders and abbreviated before the depressed truncate basal margin. Scutellum pointed and recurved at apex. Orificia reaching the level of the corium, the erect free apical process slightly sinuate at the tip. Hemelytra reaching apex of the penultimate dorsal segment. Wings not quite reaching middle of antepenultimate segment.

Abdomen beneath transversely strigulose, female genital segments recurved.

Legs with the apical club of the femora elongate, hind femora as long as first antennal joint, a little surpassing apex of abdomen (tarsi missing). Length, ♀ 10 mm.

West Africa (Assini).

Larger and darker than *C. malacaipus* Stal, and distinguished by the very long third antennal joint, the much less elevated humeral angles of the pronotum, the posteriorly less elevated median pronotal ridge, and the almost uniformly colored, not black-speckled legs and first three antennal joints.

Capyella lobulata Bergr.

This species, described in 1909, has recently (1911) been redescribed by Distant under the name *Metatropis tipularia*. Distant's type and the specimens described by me are from the same locality, Port Darwin, in N. W. Australia. In the genus *Metatropis* Fieb. the head has no frontal spine, the ocelli are more approximate, the orificia are not freely prominent upward at apex, etc.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

TO CONTRIBUTORS.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, four weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form and without covers, will be given free, when they are wanted; if more than twenty-five copies are desired, this should be stated on the MS. The receipt of all papers will be acknowledged. Proof will be sent to authors for correction only when specially requested.—Ed.

PHILADELPHIA, PA., NOVEMBER, 1911.

As the time for the annual meeting of the Entomological Society of America approaches, it may not be amiss to report some ideas lately expressed by two of its members discussing the Society.

The time at the disposal of the Society for its annual meeting is very brief. That time should be put to the best use. Therefore, it was held, that what the Society should chiefly attempt to do is:

To discuss and take appropriate action to elevate the standards of entomological work and writings.

To further the co-operation of entomologists in different parts of the country.

To increase the acquaintanceships, and to promote good fellowship, among the entomologists of America.

To represent the collective opinion of American Entomologists.

To discuss and formulate rules, regulations and recommendations concerning nomenclature, *nomina conservanda*, descriptions, methods of publication, and all other matters of entomological interest for adoption by International Congresses of Entomology and of Zoology and their Commissions.

To limit the papers read at the annual meetings to those of general interest and importance and to insist that every paper should be presented within a brief time, say ten or fifteen minutes.

Papers treating of details of taxonomy, of morphology, of anatomy, etc., without wide application, should be given before the local entomological societies whose more frequent meetings provide time for adequate presentation.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Preservatives against the attacks of Dermestids.—The German Entomological Society held a discussion on this topic at its meeting of March 13, 1911, of which the following is a translation from Deutsche Entom. Zeitschrift, 1911, pp. 350-1. Höfig showed some larvae and adults of a species of *Dermestes* which had arrived alive in an invoice of cat gut strings prepared with naphthaline from Australia. The material had been totally destroyed by these beetles. The speaker asked if any of the members knew of a radically effective means against the *Dermestes* plague. Ohaus remarked that, from his earlier experience as a ship's surgeon, naphthaline was not a means for killing Dermestids if the material in question, skins, feathers, etc., had already been infected with the larvae or eggs of *Dermestes* before treatment with naphthaline. He recommended carbon bisulphide as a good annihilator. Harms said that sprinkling with anise powder was a radical means of destruction. Bertling advised the sending of raw materials in liquids to avoid injury from *Dermestes*. Ohaus mentioned that in the rainless regions of South America carcasses of animals, etc., are almost exclusively visited by *Dermestes vulpinus* in countless numbers. Along with *Dermestes*, *Trox suberosus* and *Corynetes* sometimes appear in quantities. In almost all cases of injury *D. vulpinus* comes in question as Prof. Kolbe had determined in the case cited by Höfig.

On the Use of the Genus Araneus Clerck.—In the past few years several arachnologists, Simon, F. O. P. Cambridge, Strand, and some American authors have used the genus *Araneus* Cl. to replace *Epeira*. On the contrary I have held to *Epeira*, as it is supported by the various codes of nomenclature.

The case is very simple. *Araneus* or *Aranea* was not divided until 1804 when Latreille (Nouv. Dict.) created several genera at its ex-

pense. Latreille did not here give any types; he left in *Aranea* 3 species (although he did not account for all previous species).

Now F. O. P. Cambridge holds (Ann. Mag. Nat. Hist. (7) vol. VII, p. 61) that in mentioning only these three species under *Aranea* he thereby limits *Aranea* to them, and the type must be one of these three, instead of any of the numerous species originally under *Araneus*. This interpretation was somewhat warranted by the International Congress at Moscow in 1892, but it is not in any way warranted by the International Code now, the Boston meeting having distinctly ruled on methods of type-selection; nor is it supported by the Ornithologists' Code. The listing of species in genera does not in any way affect the selection of type. Any species originally in the genus is eligible as type, or according to some any not already types of other genera. From 1804 till 1810 there was no indication of type, but in 1810 Latreille (in Consid. gener.) gives as type of *Aranea—A. domestica*, an eligible species.

F. O. P. Cambridge held this invalid because *A. domestica* was not included by Latreille in *Aranea* in 1804 as one of the three species, but as shown above zoological rules do not accept the mere division of a genus without type-selection as affecting type-selection. Therefore if *Araneus* is to be used it has as its type *A. domestica*, and thus would replace *Tegenaria*, and not *Epeira*.

In 1806 Latreille gave *Aranea* with *Tegenaria* and *Agelena* as synonyms but without type-selection.

If Latreille in 1804 had mentioned but one species in *Aranea* it would not be the type, it must be stated to be the type.

According to rules the genus *Araneus* must be used; it cannot be discarded on the grounds given by Thorell and Sundevall.

It may be remarked that Lamarck in 1801 cites two species as representing *Aranea* (one *A. domestica*) so that he did not fix the type although some consider that where he gives but one species it is type-selection.—Nathan Banks, East Falls Church, Virginia.

Migrations of Dragonflies (Odonata) and of Ants (Hymen).—Under other cover, I send you a number of dragonflies, apparently of the same species. These with many others, I knocked down with my hat during their migration last evening [Sept. 2, 1911].

We have a cottage at the end of Cape May, near the new hotel, known as the eastern extension. Between us, the ocean, the thoroughfare and Sewell's Point there is nothing but a waste of newly filled-in sand and a few cottages; no ponds, pools or depressions.

I noticed the first of the flight about 5.45 P. M. in a few stragglers flying near the house, swiftly and in one direction, [which, from a sketch included in Mr. Wolf's letter was from northeast to southwest, the wind blowing at the time in the opposite direction]. Then they

came in augmented numbers, until they finally fairly catapulted by in thousands and tens of thousands without interruption until it became too dark any longer to see them.

From out-to-out the flight had a width of 486 paces, outside of this there were not even stragglers. Our house seemed to be the very center of the flight.

The flies flew near the ground and up as high as they could be distinguished, the greater number at about the level of the roof of our cottage. They moved at high speed and fairly streaked past, so that the eye would take in dozens at a time in looking forward or upward. At first it was difficult to hit any with a hat, but a short half-hour later they came in such great numbers that I struck many of them. It became dark before I picked them up, so missed many, which were blown away during the night. Many others were devoured by ants before I searched the ground this morning. Two of the mutilated I enclose in the package.

Prior to the appearance of the dragonflies my son and daughter passed through a flight of ants while on the trolley car on a run to Cape May Point, the other extreme of this settlement. They were of two sizes, small winged ants and others shaped like a wasp, but the size of a "yellow-jacket," and their flight was over the space from the Point Life-saving Station to the trestle below Cape May proper, a distance of over half a mile. My children report the air full of flying insects, so that passengers on the car were covered with them. The direction of their flight was also *against* the wind, but in an opposite direction to the later flight of the dragonflies, and probably a mile distant.

The swarm was followed by flocks of birds, sparrows, swallows, martins, etc.

The observers also stated that the migration seemed distinctly defined, and that on the trolley "everything was crawling with them." The observation was made at about 3.45 to 4 P. M.

I do not think that the two flights had any relation to each other.

My children brought home no ant specimens.—Herman T. Wolf, Cape May, New Jersey, Sept. 3, 1911.

[The dragonflies sent by Mr. Wolf as forming part of the swarm were all *Anax junius*, Drury, 4 ♂♂, 4 ♀♀.—P. P. Calvert.]

Jelly Rain.—On the morning of Saturday, June 24, the ground here was found to be covered with small masses of jelly about as large as a pea. There had been heavy rain on Friday night, and it was raining at 7 a. m., when, so far as I can ascertain, the phenomenon was first seen. On being examined microscopically, the lumps of jelly turned out to contain numerous ova of some insect, with an advanced embryo in each. The egg itself is very minute—an elongated

oval 0.04 mm. in length. Yesterday and the day before many larvae emerged, and were obviously those of some species of *Chironomus*, though colorless, having no haemoglobin, as is the case with the larvae of *C. plumosus*. Not being an entomologist, I am at loss to understand how these egg-masses could have appeared where they did unless they were conveyed by the rain, as it does not seem likely that the midges would have laid their eggs on pavements, gravel paths, tombstones, etc., even had they been wet; nor has any large number of adult insect been seen in the locality. It would be interesting to hear whether the same thing was observed elsewhere, and whether the phenomenon often occurs. Showers of algae, small snails and even frogs have been recorded from time to time, but I cannot recall a like instance to the above.—M. D. Hill, Eton, Bucks, England, June 30 (*Nature*, July 6, 1911.)

American Association of Economic Entomologists.—The twenty-fourth annual meeting will be held at Washington, D. C., December 27-29, 1911. Owing to the large attendance that is assured and to the numerous meetings which will be of interest to entomologists, an arrangement has been made so that the meetings of related societies will be held with as little conflict as possible.

The meeting of the Entomological Society of America will be held on Tuesday, December 26, and on the morning of the following day, December 27. The public lecture before that Society will be held Wednesday evening.

The first session of the meeting of the Association of Economic Entomologists will be held Wednesday at 1 P. M. At this time the annual address of the President, Prof. F. L. Washburn, of Minnesota, will be delivered and the opening business of the meeting transacted. The meeting will be continued on Thursday, morning and afternoon, and on Friday at 10 A. M. the closing session will be called to order.

The meeting of the American Association of Official Horticultural Inspectors will begin Thursday, December 28 at 8 P. M., and the sessions will be held Friday afternoon and evening and on Saturday should the length of the program warrant it.

An arrangement has been made whereby the December number of *the Journal of Economic Entomology* will be published earlier in that month than has been the custom in the past so that the members will receive it before the time of the meeting. The full program will appear in this issue and further details concerning hotel headquarters and other arrangements.

By vote of the Association at one of the recent meetings, members are requested to condense their papers so that the facts can be presented in fifteen minutes. In anticipation that the program will be crowded, it is suggested that members who may desire to submit more

than one paper at the meeting be requested to designate which paper they are most desirous of reading in order that the others may be read by title if the program renders this necessary. President Washburn has suggested that each member who presents a title for a paper be allowed to designate a member to lead the discussion, and it is desired that the name of the leader of the discussion on each paper be placed on the program. Each member who selects a leader to discuss a paper which he presents must make proper arrangements with the member selected. In order that the program may be made up for prompt publication in the Journal all titles of papers to be presented must be in the hands of the Secretary not later than November 10, 1911.

The attendance at the meeting promises to surpass all previous records, the advantages of Washington as an entomological center are unsurpassed and all members or visitors will be most welcome—F. L. Washburn, *President,* St. Anthony Park, Minn. A. F. Burgess, *Secretary,* Melrose Highlands, Mass.

Butterflies of Montour County, Pennsylvania (Lepid).—Following is a list of the butterflies as far as they have been collected in Montour County. Those marked (*) are listed from the collection of Dr. and Mrs. H. B. Meredith, of the Danville State Hospital for the Insane. Those marked (†) I have seen but not taken.

Anosia plexippus
Euptoieta claudia
Argynnis idalia
Argynnis cybele
Argynnis aphrodite
*Brenthis myrina**
Brenthis bellona
Melitaea phaeton
Phyciodes tharos
Grapta interrogationis
*Grapta interrogationis fabrici**
Grapta interrogationis umbrosa
*Grapta comma dryas**
*Grapta comma harrisi**
Grapta progne
Vanessa j-album
Vanessa antiopa
Pyrameis atalanta
Pyrameis huntera
*Pyrameis cardui**
Basilarchia astyanax
Basilarchia arthemis lamina†
Basilarchia arthemis proserpina
Basilarchia disippus
Neonympha eurytus
*Neonympha sosybius**
Satyrus alope
Satyrus alope nephele
*Thecla melinus**
Thecla calanus
Thecla liparops
Feniseca tarquinius
Chrysophanus hypophlaeas
Lycaena pseudargiolus
*Lycaena pseudargiolus marginata**
*Lycaena pseudargiolus violacea**
*Lycaena pseudargiolus neglecta**
Lycaena comyntas
*Lycaena scudderi**
Pieris protodice
*Pieris napi**
Pieris rapae
Colias philodice
Terias nicippe
Terias lisa
Papilio turnus

Papilio turnus glaucus
Papilio cresphontes†
Papilio asterias
Papilio troilus
Papilio philenor
Epargyreus tityrus
Thorybes pylades
*Thorybes bathyllus**
Achalarus lycidas
Hesperia tesselata
Pholisora catullus
Thanaos brizo
*Thanaos lucilius**
Thanaos martialis
Ancyloxypha numitor
Erynnis leonardus
*Thymelicus brettus** (?)
*Atalopedes huron**
Polites peckius
Limochores taumus
Euphyes verna
Atrytone cabulon
Pamphila otho egeremet

Rev. J. C. Stamm,
Danville, Pa.

Mr. A. F. Porter, of Decorah, Iowa, and Mr. John M. Geddes, of Williamsport, Pa., have joined forces for an entomological collecting expedition to the Antilles and British Guiana. They are both very enthusiastic men and are looking forward to a successful trip. They will devote most of their time to Coleoptera and Lepidoptera.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), excluding Arachnida and Myriapoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published, and are all dated the current year unless otherwise noted. This (*) following a record, denotes that the paper in question contains description of a new North American form.

For record of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington.

3—The American Naturalist. **4**—The Canadian Entomologist. **5**—Psyche, Cambridge, Mass. **6**—Journal, New York Entomological Society. **7**—U. S. Department of Agriculture, Bureau of Entomology. **8**—The Entomologist's Monthly Magazine, London. **9**—The Entomologist, London. **10**—Nature, London. **11**—Annals and Magazine of Natural History, London. **18**—Ottawa Naturalist. **22**—Zoologischer Anzeiger, Leipzig. **28**—Archives d'Anatomie Microscopique. Paris. **35**—Annales, Societe Entomologique de Belgique.

37—Le Naturaliste Canadien, Quebec. **40**—Societas Entomologica, Zurich. **42**—Journal, Linnean Society, Zoology, London. **45**—Deutsche Entomologische Zeitschrift. **49**—Annales historico-naturales Musei Nationalis Hungarici, Budapest. **50**—Proceedings, U. S. National Museum. **59**—Sitzungsberichte, Gesellschaft der naturforschenden Freunde, Berlin. **68**—Science, New York. **73**—Archives, Zoologie Experimentale et Generale, Paris. **79**— La Nature, Paris. **84**—Entomologische Rundschau. **86**—Annales, Societe Entomologique de France, Paris. **89**—Zoologische Jahrbucher, Jena. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **97**—Zeitschrift fur wissenschaftliche Zoologie, Leipzig. **105**—Videnskabelige Meddeleser, Naturhistoriske Forening i Kjobenhaven. **119**—Archiv fur Naturgeschichte, Berlin. **128**—Proceedings, Linnean Society of New South Wales, Sidney. **152**—California Agricultural Experiment Station, Berkeley. **160**—Internationale Revue der Gesamten Hydrobiologie und Hydrographie, Leipzig. **166**—Internationale Entomologische Zeitschrift, Guben. **169**—"Redia," R. Stazione di entomologia Agraria in Firenze. **179**—Journal of Economic Entomology. **180**—Annals, Entomological Society of America. **186**—Journal of Economic Biology, London. **189**—Pomona Journal of Entomology, Claremont, Cala. **191**—Natur, Munchen. **193**—Entomologische Blatter, Nurnberg. **208**—Boletin, Real Sociedad Espanola de Historia Natural, Madrid. **211**—Popular Science Monthly, Lancaster, Pa. **216**—Entomologische Zeitschrift, Stuttgart. **226**—Transactions, Academy of Sciences of St. Louis. **230**—Revista, Museo de la Plata, Buenos Aires. **234**—Records, Indian Museum, Calcutta. **236**—Boletin, Sociedad Aragonesa de Ciencias Naturales, Zaragoza. **238**—Anales, Sociedad Cientifica Argentiña, Buenos Aires. **239**—Annales, Biologie Lacustre, Brussels. **240**—Maine Agricultural Experiment Station, Orono. **243**—Yearbook, Department of Agriculture, Washington, D. C. **277**—Victorian Naturalist, Melbourne. **278**—Annales, Societe Zoologique Suisse et du Museum d'Histoire de Geneve, Revue Suisse de Zoologie. **280**—Annals Transvaal Museum, Pretoria. **281**—Annals of Tropical Medicine and Parasitology, University of Liverpool, Series T. M. **286**—Archiv fur Mikroskopische Anatomie und Entwicklungsgeschichte, Bonn. **305**—Deutsche Entomologische National-Bibliothek, Berlin. **313**—Bulletin of Entomological Research, London. **324**—Journal of Animal Behavior, Cambridge, Mass. **332**—Bulletin of the Southern California Academy of Sciences, Los Angeles. **336**—Board of Agriculture, Trinidad. **340**—Transactions of the Linnean Society of London, Zoology. **341**—Archiv fur Rassen-u Gesellschafts-Biologie, Leipzig. **342**—Pennsylvania Health Bulletin, Harrisburg. **343**—Festschrift des Vereins

fur Naturkunde zu Cassel. **344**—U. S. Department of Agriculture, Washington, D. C. **345**—Mittheilungen der Gesellschaft der Naturforscher in Kiew. **346**—Fauna Exotica, Mitteilungen aus dem Gebiete der exotischen Insektenwelt, Frankfurt am Main. **347**—Reports of the Local Government Board on Public Health and Medical Subjects (new series), London.

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Taxonomy of Family Names.—In the Annals of the National Museum of Hungary, volume IX, Dr. Horvath has recently published a paper on the Nomenclature of the Families of the Hemiptera which is of the highest importance, not only to the Hemipterist but to all students of taxonomy. It is the most sane and logical discussion of this subject which has yet appeared and should go far toward offsetting the revolutionary changes made by such extremists as the late Mr. Kirkaldy and his followers. Dr. Horvath takes the stand that we must follow priority in the names of the families as well as in that of the groups of lower value, and in this I believe he is absolutely correct. I have long advocated this in my correspondence and hinted at it in my review of the Kirkaldy Catalogue of the Pentatomidae (Entomological News, for March, 1910, p. 141), where I say that "the family and tribal names should be formed from the 'type genus,' which I take to mean the genus considered most characteristic by the founder of the family." I can see no reason why a family name so formed should not always be used for the group of genera related to the "type genus" no matter what changes may be made in the limits of such family. It seems to me this is the only way to prevent our whole family nomenclature from falling into inextricable confusion.

In this paper Dr. Horvath gives us a chronological bibliography of each family name in the Hemiptera, throwing out all that are not Latin, and it is encouraging to note that in this order nearly all our old familiar family names will stand. I believe the same conditions would prevail in nearly all orders if this rule is adopted by the next

Zoological Congress in the form in which it was presented by Dr. Horvath to the Congress of 1910.

By Dr. Horvath's plan the following controverted family names in the Hemiptera will stand in the form in which we have long known them: Plataspidæ, Cydnidæ, Pentatomidæ, Pyrrhocoridæ, Lygæidæ, Berytidæ, Phymatidæ, Cimicidæ, Anthocoridæ, Capsidæ, Hebridæ, Mononychidæ, Jassidæ, Cercopidæ, Delphacidæ, Flatidæ, Psyllidæ.

In common with most European entomologists, Dr. Horvath has followed Latreille in placing *Salda* Fabr. as a synonym of *Acanthia* Fabr. I claim that Fabricius had the right to limit his own genus *Acanthia* to *Cimex lectularius* Linn, and its allies and to establish his genus *Salda* for the littoral species, and consequently I still use the names *Salda* and *Saldidae* in place of *Acanthia* and *Acanthiidae*, but in all other cases I most heartily endorse Horvath's nomenclature.

The Doctor has made an error in crediting me with being probably the first to use the name Thyreocoridæ for Cydnidæ. The fact is I have never used this name in that sense but only in place of Corimelænidæ which I still consider a distinct family, or at least subfamily. If merged with the Cydnidæ it must fall as a synonym.—E. P. Van Duzee, Buffalo, N. Y.

The Reduction of Domestic Mosquitoes.—Instructions for the Use of Municipalities, Town Councils, Health Officers, Sanitary Inspectors and Residents in Warm Climates, by Edward Halford Ross, with illustrations, P. Blakiston's Son & Co., Philadelphia. Price $1.75 net.

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This work will be very useful and valuable to the persons whom it is intended to aid. There is no reason at the present time why people should suffer the terrible annoyance and disease caused by these insects, unless it be in extensive areas like our New Jersey coast, where the present preventive methods make the cost of the necessary work prohibitive.—H. S.

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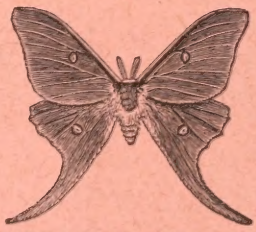

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